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The Microscopical Examination of Seminal Stains on Cloth.

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Having occasion last January to examine some seminal stains on cloth, I sought to avail myself of the experience of others. I found that all writers on medical jurisprudence and microscopy, including such names as those of Taylor, Beck, Beale and Frey to whom I had ready access, adopt and recommend the method of Dr. Koblanck, of Berlin, published in 1853.

"It is briefly as follows: Cut out the portion of cloth suspected. Place it in a watch glass with a few drops of distilled water; let it soak for a few minutes (variously stated from two to ten;) stir it about with a glass rod, and then squeeze out the water with the fingers. This squeezing may be done directly upon the slide or into the watch glass, whence a portion may be taken up by a pipette and transferred to a slide.

"Following this plan with a piece of cloth known to be stained with semen, I obtained such poor results that I resolved to try some other method. Remembering how transparent a fine linen fabric appeared on a certain occasion when I was studying its fiber, I resolved to subject a portion of the cloth itself at once to the microscope. Taking a small piece of the linen and placing it upon a drop of water on a slide, I let it soak for a while then put on a cover glass and proceeded to examine it. Almost immediately I discovered a number of spermatozoa clinging to the fibers of the linen or lying in masses in the meshes. Encouraged by this success, I experimented with fabrics other than linen. In light-colored silk the spermatozoa were detected quite as easily as in linen. A firm piece of cotton sheeting proved refractory, till I thought to unravel or fray out the ends, when I readily found the zoosperms adherent to the detached fibers.

"Having experimented with the fabrics commonly used for under garments, I turned my attention to colored woolen goods. These were not, of course, sufficiently transparent to render the above plan practicable; so with a keen scalpel, I shaved off a portion of the stained surface, which fell in a fine dust upon the slide. This was moistened, and after soaking a while was examined. The spermatozoa were found even more readily than in the other experiments. The superiority of this method over that recommended in the books is shown by contrasting results. A piece of linen, known to be stained with semen, was most carefully treated according to Koblanck's method, and a drop of the deposit examined. Over an hours careful and patient search was rewarded with a view of just one whole spermatozoon. But on taking a small piece of the cloth, a portion of which had been experimented on as above, and placing it under the microscope, I found within two minutes several perfect specimens.

"Dr. Koblanck contends that if spermatozoa are not found by his process, it may be asserted the stains are not seminal. I not only dissent from this, but I believe that his manipulations actually destroy spermatozoa when present, not all, perhaps, but to such an extent as to make uncertain their discovery. This statement is based upon the following facts: Semen deposited upon any surface dries in semi-transparent masses or scales. It seems impossible by redissolving these to obtain the spermatozoa intact. In the process of resolution they disintegrate and are lost, or at best but a few heads remain. To use a homely illustration, the string around which rock-candy has crystalized may be recovered intact when the candy is dissolved away; but the delicate and friable spermatozoa break down and disappear with the substance which incrusted them.

"Out of the thousands which must have been deposited upon the piece of linen treated by Koblanck's method, I could find only one spermatozoon I would have ventured to swear to in a court of justice. This same piece was examined under the microscope, and only a very few were found which had not been removed by the washing. But on another piece, taken from the same stain, and submitted at once to the microscope, they were found in quantities. If not destroyed by Koblanck's method, they should have been found either in the deposit from the washings, or upon the cloth itself.

"This view is supported by the following experiments: 1. The sides of a glass vessel were smeared with semen. When this was thoroughly dried, the glass was filled with water and allowed to stand for ten hours. Portions of the semen were seen to separate in thin films and sink to the bottom. Examination of this deposit detected only a very few free spermatozoa, and in the films many of the spermatozoa were sharply defined, but the vast majority of the latter seemed to be disintegrating, and the field was filled, outside the bounderies of the films, with highly refractive bodies which I *thought* might be fragments of the heads of the spermatozoa, but of this I was not certain. They were irregular in outline, and were not oil globules. 2. As is well known, semen when first emitted is quite thick and gelatinous, but soon becomes much more liquid. Some that had become thus liquified was placed upon a slide and permitted to flow about, drying in some places in a film of extreme tenuity, and elsewhere in thicker layers. These thicker portions contracted in drying, and scales became detached from the glass. When subjected to water under the cover glass, these scales behaved in all respects like the films from the sides of the glass vessel in the experiment related above, but over the exceedingly thin portions many of the spermatozoa were found free and floating about.

"From these experiments it seems reasonable to conclude that when semen dries *en masse* and is then subjected to the solvent action of water, the integrity of the spermatozoa is quite generally destroyed, and that those found free and whole are such as dried with little or none of the muco-albuminous fluid of the semen about them.

"When semen from urine is allowed to dry upon cloth, these scales, or dried masses, are not often seen, for the muco-albuminous fluid has been very greatly diluted. The spermatozoa are not so numerous, also, but are generally found more easily, for they adhere less closely to the fibers.

"Hence Koblanck's method, with its soakings and manipulations tends to destroy so many of the spermatozoa as to lessen greatly the certainty of finding them, and even, I have reason to believe, has occasionally frustrated the ends of justice.

"I, therefore, recommend the following procedures:

"1. If the stain to be examined is upon any thin, cotton, linen, silk, or woolen fabric, cut out a piece about one-eight inch square, lay it upon a slide previously moistened with a drop of water, and let it soak for half an hour or so, renewing the water from time to time as it evaporates. Then with a pair of needles unravel or fray out the threads at the corners, put on the glass cover, press it down firmly, and submit to the microscope.

"2. If the fabric is of such a thickness or nature that it can not be examined as above, fold it through the center of the stain, and with a sharp knife shave off the projecting edge thus made, catching upon a slide moistened with water the particles removed. After soaking a few minutes—say five to ten—the powdery mass will sink down through the water and rest upon the slide. The cover-glass may now be put on and the preparation examined.

"The latter plan serves as well for hairs, but great caution must be observed in cutting them lest the portions bearing the suspected deposit fly away and are lost.

"Whichever plan be appropriate, it is best first to moisten the slide with a drop of water. In the former case, by laying the cloth upon the water we get rid most easily of the air-bubbles, and in the latter the water preserves the powdery portions cut off from being lost, and they are not rolled to one side, as when the drop of water is subsequently applied.

"Should it be desired to preserve any of these preparations for production and examination in court, I have found that to hold down the cover glass with a spring clip, and run around it a circle of liquid marine glue, serves at least a temporary purpose.

"A piece of stained muslin lay nearly two months without protection upon my working table. I then mounted a portion of it in water, as above described. It now, at the end of five months, shows the spermatozoa as well as ever. For permanent mounting I should suppose the addition of carbolic acid, chloral hydrate, or some such perservative would be of service. I have not found it necessary to use any dye or any solvent except water. A power of three hundred diameters is amply sufficient for these examinations.

"Concerning the durability of spermatozoa, Ritter asserts that he has discovered them after a period of four years. To show how, when dried, they will bear rough handling, I may add that I rolled and twisted between my fingers a stained piece of muslin till it was in the form of a string, unrolled and twisted it over again two or three times, using much force; and was yet able by my method to discover spermatozoa without much difficulty.

"I have sought to put this matter upon such a footing as to enable the medical witness to testify positively in court as to whether a certain stain is or is not seminal.

"I claim for my plan extreme simplicity, ease of execution, and the greatest degree of certainty, for piece after piece of the stained fabric can be put to the test with the assurance that nothing in the process destroys the spermatozoa, and that they may be found if present."